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ABSTRACT

Approaches to sampling are suggested for use by states in reporting more effectively on the completers and leavers in vocational education programs. Following an introductory chapter, six others outline the proposed plan for followup studies. Chapter 2, a task outline for a proposed ongoing sampling survey, divides the first three of the followup years into fifteen steps, presented in chronological order, that show both the timing of operations for a given survey year and also how the final stages in completing one year's survey overlap with the preparatory stages for succeeding years. (Beginning year 4, the ongoing survey enters a repeat cycle of basically the same steps used in year 3 to complete each successive followup survey.) Chapter 3 lists details of the one-stage sampling plan and is divided into three sections: (1) method of selection, (2) proposed sample sizes, and (3) reliability of sample estimates. Chapter 4 gives approximate costs for the proposed one-stage survey design, speculated on the basis of experience in other studies. Chapter 5 deals with instrument development (a background questionnaire, a student followup questionnaire, and an employer instrument). Chapter 6 suggests how to achieve a high response rate from the mail questionnaire, and chapter 7 offers procedures for analysis of survey results. Topics appended are these: changing the sampling rate for an ongoing survey, interim procedures for obtaining followup data prior to the maturing of the ongoing survey, the development of a national sample of vocational schools and students, and VEDS questionnaires. (VB)

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DEVELOPMENT OF SAMPLE DESIGNS FOR THE FOLLOWUP OF VOCATIONAL EDUCATION STUDENTS

Final Report
Contract No. 300-76-0431

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Submitted by:

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11600 Nebel Street
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September 22, 1977

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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1. INTRODUCTION

The Vocational Education Amendments of 1976 specify that States are to use "wherever possible statistically valid sampling techniques" in order to be able to report on the status of vocational education in their State. This report suggests some approaches to sampling that might be appropriate for the States to follow so that they are able to report more effectively on the completers and leavers in their programs. It also provides a task approach to the actual conduct of a survey in a particular State, identifying major tasks necessary to complete one full cycle (three years) of the survey. We have included in the appendix an alternative to this three year cycle if data is required sooner for Federal reporting purposes.

The report discusses some tentative costs for conducting a survey in a State. We caution here that these costs will vary a great deal from State to State and that the figures that we have provided must be considered very preliminary in nature.

We have also provided some techniques for States to consider in achieving a high response rate since this is a very important consideration in the data collection portion of the survey if the results are to be reasonably valid.

In addition to the information required to carry out the scope of work for this contract, we have taken the liberty of discussing, in Appendix C, the selection of a national vocational sample of schools and students that would have a number of important uses to BOAE for future planning. Our discussion is quite general and we would be delighted to expand on it at any time. It should be kept in mind that this national sample is a concept that would provide BOAE with a capability for gathering

limited information on almost any issue that requires inputs from the field. The information could be collected relatively quickly and within a reasonable cost.

This report has been written primarily to provide information to BOAE and does not spell out detailed guidelines and procedures for the States to use in carrying out a survey. This would be the next step in the process.

2. A TASK OUTLINE FOR A PROPOSED ON-GOING SAMPLING SURVEY FOR THE FOLLOWUP OF FORMER VOCATIONAL EDUCATION STUDENTS

This section of the report provides a brief summary of the major steps that are involved in the proposed plan for follow-up studies of former vocational education students on a sample basis. The summary is presented in chronological order, showing both the timing of operations for a given survey year and also how the final stages in completing one year's survey overlap with the preparatory stages for succeeding years.

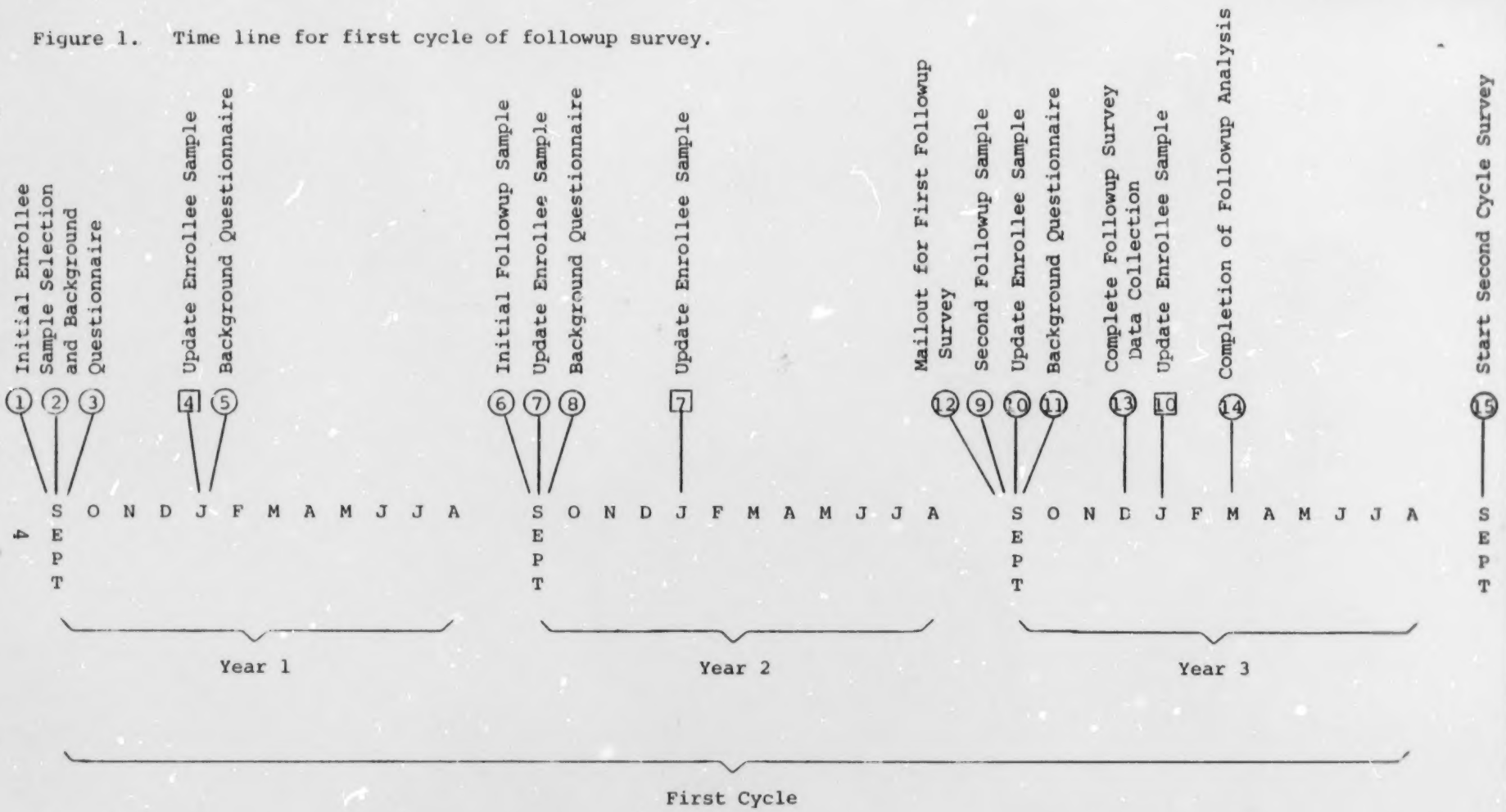
Figure 1 shows a time line for the completion of the first cycle of the survey. It should be noted that followup data will not be available -- following this plan -- until well into the third year of the cycle. Then data will be available on a yearly basis.

- Year 1

Step 1. Obtain List of Current Vocational Students in State. (Start, Year 1 of Survey)

As soon as possible after the beginning of the school year, the State office in charge of the survey, will obtain a list of all students in the State currently enrolled in vocational education programs. This list could be obtained from a number of sources with fall enrollment reports probably being the most reliable. This would require little or no additional work on the part of the individual schools.

Figure 1. Time line for first cycle of followup survey.


1 Initial Enrollee Sample Selection and Background Questionnaire
2
3
4 Update Enrollee Sample
5 Background Questionnaire
6 Initial Followup Sample
7 Update Enrollee Sample
8 Background Questionnaire
7 Update Enrollee Sample
12 Mailout for First Followup Survey
9 Second Followup Sample
10 Update Enrollee Sample
11 Background Questionnaire
13 Complete Followup Survey Data Collection
10 Update Enrollee Sample
14 Completion of Followup Analysis
15 Start Second Cycle Survey
4 S E P T O N D J F M A M J J A S E P T O N D J F M A M J J A S E P T O N D J F M A M J J A S E P T
Year 1
Year 2
Year 3
First Cycle

☐ = Optional at this time.

Step 2. Draw First Enrollee Sample

A systematic sample of students still in school will be selected from the universe list obtained in Step 1. The discussion of these sample selection procedures will be detailed in Chapter 3, however, it is assumed that there will be a random start, and a specified rate of sampling of 1 in every "n" students.

Step 3. Background Questionnaire for Each Student in First Enrollee Sample. (Immediately following sample selection)

The cooperation of the schools will need to be obtained in having students participating in the survey complete the background questionnaires. These questionnaires should be filled out promptly to minimize the risk that one or more sample students leave before providing the background information. The background questionnaire would be used to; (a) increase the probability that the student will cooperate with the followup phase of the survey, and (b) have information collected while the student is still in the program so that it accurately reflects the student's perception of the program. The State survey office will set up a file for all participating students. Each student will be represented in a file, either by a completed background questionnaire or by a substitute form that will include all known information regarding the student plus the reason for nonresponse to the background questionnaire.

Step 4. Update Enrollee Sample. (Periodically, perhaps beginning with the start of the second semester of Year 1)

Each State will need to work out a practical schedule for getting a sample of new students to update its ongoing sample. An important factor for States to consider in deciding how frequently

this updating should be done is the length of time it takes a student to complete the shortest vocational programs. It is obviously undesirable to have a group of students that enter and complete a program between updates of the sample since they will almost surely be missed if sampling is done from lists of current enrollees. If such students should happen to fall in sample, it will be more difficult to get their cooperation because in many cases they may have graduated and/or left school. If some programs can be entered and completed within one school semester, then sample updating will need to be done once each semester, near the beginning.

Perhaps the most feasible plan for obtaining the update is to forewarn each school that it will need to maintain a list of all eligible students who newly enroll at anytime after the sample was last updated. The school would maintain the list adding any new student whenever he/she enters during the semester. The school will not send a copy to the State until the start of a new semester, so that the list can include students newly added for that period of time.

Step 5. Background Questionnaire for Each New Student in the Updated Enrollee Sample. (Immediately following sample selection)

As before, these questionnaires should be filled out as promptly as possible to minimize the chance that any new participating student leaves school before being informed about their obligations for the sample survey. Schools can be given an oversupply of questionnaires during the initial mailout from the State to account for these new students.

- Year 2

Step 6. First Followup Sample Identified. (Start, Year 2 of survey)

As soon as possible after the beginning of the school year, the State will send to each school a list of students from that school who are in the State's enrollee sample file. The school will be asked to check each name against their records to determine whether (1) that student is currently enrolled in school, or if not, whether (2) that student completed a vocational education program, or if not, whether (3) that student left school for a reason other than graduation.

When these lists have returned to the State office, they will take Group 2 (the completors) and Group 3 (the leavers) and set up a new file for them. These two groups, in combination, will constitute the Year 1 Followup Sample. The students identified by the schools as in Group 1 (the holdovers) will be retained in the Population Sample File.

Step 7. Updating Enrollee Sample by Sampling from New Students. (Periodically during Year 2, continuing the schedule established in Year 1)

As an absolute minimum, a sample of new enrollees should be added to the State's file of sample enrollees at the start of each school year. It is likely that most, and perhaps all States will need to have one or two additional updates during the school year to provide for those vocational educational programs that can be completed in less than a year. (See discussion in Step 3.)

Step 8. Background Questionnaires to New Students. (Same as Step 5)

- Year 3

Step 9. Second Followup Sample Identified. (Start, Year 3 of survey) NOTE: This step follows the same procedures used to set up the First Followup Sample (See Step 6)

Each school will receive a list of students from that school that are currently in the enrollee sample. The school will establish for each name whether the student is a holdover (i.e., Group 1, still enrolled in Year 3), a completer (i.e., Group 2, no longer enrolled, graduated from a vocational education program or a leaver (i.e., Group 3, no longer enrolled, left school without completing a program). Group 2 completers and Group 3 leavers will, in combination, constitute the Second Followup Sample. Group 1 holdovers will be retained in the Student Sample File.

Step 10. Updating Enrollee Sample from New Enrollees. (Periodically, during Year 3)

These updates use the same procedures and continue the schedule established in Year 1. (See Step 4.)

Step 11. Background Questionnaires to New Students. (See Step 5)

Step 12. Mail-out Questions to First Followup Sample. (Early fall, Year 3 of Survey)

For those completers who finish up at the end of Year 1, exactly one year after graduation comes at the beginning of summer. On the basis that summer would be a relatively poor time to conduct this survey, it is proposed that the first mail-out of followup questionnaires be conducted in early fall.

The purpose of the followup questionnaire is to learn how "successful" (in terms of work experience and earnings) the former student has been since leaving school, to what degree this work experience has made use of the vocational training he/she received, and to get an evaluation of how well qualified he/she is for work in the field in which training had taken place. When the former student is currently working for someone else, that employer may be sent a questionnaire (with the former student's permission, of course) to solicit the employer's judgment concerning how well qualified the former student is for work in the field in which he/she was trained.

Step 13. Completion of Field Phase, First Followup. (Fall, Year 3 of Survey)

The field effort should adopt, as its minimum goal, reducing the number of nonresponding former students to less than 20 percent of the total sample. In order to accomplish this, it is recommended that nonrespondents be given three mailings (i.e., the original mail-out plus two mail followups) and that residual nonrespondents be contacted and interviewed by telephone. Whenever there is a problem in locating the former student (either by mail or by telephone), then contact will be made with a relative or friend of the former student who is likely to know where the student is. (The name and address of such a relative or friend will be requested in the background questionnaire.)

Step 14. Processing and Analysis of First Followup Returns

After acceptable response rates have been achieved, the returned questionnaires will be edited, tabulated and analyzed. The major break within the followup sample - the distinction between completers and leavers - will be maintained throughout the analysis.

The proposed sampling rates and sample sizes for each State and territory (see Tables 1 and 2) were based on the numbers of completers reported for fiscal year 1975. It was not feasible or desireable to propose the same sample size for a State with relative few completers as for a State with a large number. As a consequence, the small States should, in general, limit themselves to simple distribution that can be used to estimate the proportions of total completers with specified characteristics. Some of the large States, on the other hand, will -- with the proposed sample sizes -- be able to justify more detailed analyses, in which, for example, statistically significant differences among completers may be looked for between one major field of training and another.

After followup data have been gathered over several years, even the small States may get added insights, derived from an accumulation of experience. Some caution should be used, however, in combining data over time, since shifts in the labor market situation may change the chances of "success" for completers, even when it is reasonable to assume that the quality of the student and the quality of the training has been relatively stable.

The analysis of followup returns from leavers should presumably not be focused on the same issues as the analysis of returns from completers. Clearly, it is not reasonable to expect the leavers to have any great "success" based on the training courses they did not complete. Rather the sample of leavers may be useful in supplying the following kinds of information: (1) How large is the leaver group relative to completers? (Apparently, simple counts of leavers are not now available.) If the number of leavers in sample is large enough to justify analysis, (2) What are the most common reasons for leaving? (3) Are leavers concentrated or dispersed among the fields of training? and (4) What is the situation of the leavers at the time of followup? - (i.e., back in school, employed, unemployed, no longer in labor force).

Second Cycle Survey

Step 15. Step 14 Completes the First Cycle Followup Survey.

Beginning in Year 4, the ongoing survey enters a repeat cycle of basically the same steps used in Year 3, to complete each successive Followup Survey.

In Year 4, for example:

- Year 3. Followup Sample Identified (See Step 9).
- Updating Enrollee Sample for New Enrollees (See Step 10)
- Mailout Followup Questionnaires to Year 2
- Followup Sample (See Step 12)
- Completion of Field Phase, Year 2 Followup (See Step 13)
- Processing and Analysis of Year 2 Followup Returns (see Step 14)

3. DETAILS ON THE ONE-STAGE SAMPLING PLAN

This chapter provides the specifics of a quite simple sample design that might be adopted -- with some flexibility in the detail of its operations -- by individual States and territories. A prominent consideration in what is being proposed is that some agencies that undertake this survey will not have had previous experience in operating a survey based on a probability sample. Consequently, the attempt has been made to suggest a plan for which the sample will be easy to draw, the survey procedures will be uncomplicated, the processing of data simple, and the evaluation of the reliability of results straight forward. If carried out with a reasonable amount of care, this design should be effective in providing information of high quality to the States and territories.

3.1 Method of Selection

Note at the outset that though the final followup questionnaire will only be sent to former students after they have been out of school a year or more, the original sample will be selected from all eligible enrollees while they are still in school. The sample enrollees will be checked periodically (once a year) to determine which of them have, in the meantime, left school. All of these, both completers and those leaving for other reasons, constitute the sample that will be scheduled for followups about a year later. Assuming that the survey is ongoing, all sample enrollees will eventually become part of the Followup Sample.[1]

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[1]Exception: Students that die will, of course, drop out of sample.

Making sample selection from enrollees, rather than from completers and leavers, makes it possible to have an initial contact with the student about the followup survey while he is still in school. We believe that such an initial contact can be used (1) to improve response rates for the followup questionnaire and (2) to provide better background data for the followup analysis.

The first time a sample of enrollees is selected, the list used should be inclusive of all students in the State currently enrolled in vocational education programs eligible for the follow-up survey (see Chapter 2, Step 1).[2] Periodically thereafter, a sample of "holdover" enrollees is already available, so that it is only necessary to supplement the "holdover" sample with a selection from students eligible for the survey who have enrolled since the last sampling date (see Chapter 2, Step 4 or Step 7).

The proposed method for selecting sample enrollees is known as systematic sampling. This method of sampling requires that a complete list of enrollees eligible for the sample be available or be constructed; moreover this list should be unduplicated (i.e., no eligible student should be listed more than once). It can be arranged in any convenient order, although it is desireable, but not necessary for it to be arranged by program within school and alphabetically within program.

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[2] Actually, if a list is not readily available of those students that are enrolled in vocational programs (in a school that has enrollees that are both in and not in vocational programs) the sample can be drawn from a complete list of all students, including those not enrolled in vocational education. Then after the sample is drawn only the sample names need to be checked to determine those that are enrolled in vocational education. Those in the sample that are so enrolled will constitute a valid sample of eligible enrollees. We proceed with the discussion as though lists of eligible enrollees are available, but this adjustment in procedure can be made whenever it is found to be advantageous.

Note that, if a list of enrollees is available that is otherwise acceptable, it is unlikely that the State would need to rearrange the order of listing for purposes of sampling. Practically any systematic ordering of enrollees can be used as long as there is no manipulation of the list to put certain enrollees in sample -- or to leave certain enrollees out of sample. Thus, the list can be considered systematically arranged if enrollees are entered chronologically, in order of date of enrollment. Moreover, one school might find it easier to provide a strict alphabetical arrangement of all enrollees, while another school would have its list stratified by training program, and a third school have a list in chronological order. These various school lists could be used without changing the ordering within any one list, but simply ordering the school lists systematically (e.g., in order of school number, or alphabetically by school name) and carrying over the counts of "n" enrollees from one school list to the next.

The sampling procedure is to select one enrollee listing for the sample from each consecutive listing of "n" enrollees (where the sampling rate is specified as "1 in n"). This is accomplished by taking a random number "k" from the numbers 1 through n, inclusive. Count down the list of enrollees to the "k"th name; this enrollee is the first one chosen for the sample. Continue down the list for "n" additional names (i.e., to the "k + n"th name); this enrollee is the second one chosen for the sample. Continue to the end of the list, identifying each additional "n"th name as an enrollee in sample.

We suggest that the actual sampling be done centrally at the State level rather than at the school. It could be done at the school, as an alternative, but some experience shows that it is sometimes difficult to get schools to follow sampling instructions, partly because there are various special situations coming up, with cases in the sample which the central staff may not feel make

it a representative sample. The individual schools may attempt to increase the representativeness of the sample by what appear to be minor departures from the instructions, and in the process bias the sample badly. Consequently, if feasible, central sample selection is desirable. If not, selection at each school by school staff is quite feasible, but there should be some monitoring to help insure that instructions have been understood, and are being followed.

3.2 Proposed Sample Sizes

In Tables 1 and 2 we have suggested, for each State and territory, sampling rates and sample sizes, based on the numbers of completions reported for fiscal year 1975.[3] The data presented in Tables 1 and 2 are identical; the States are alphabetically arranged in Table 1 so that a State of particular interest may be easily located; in Table 2, the States are arranged by numbers of completions in fiscal year 1975, so that the patterns of State sampling rates, sample sizes, and sampling errors, are readily observable. Note, in Table 2, as the numbers of completions in fiscal 1975 decreases, the proposed sampling rates tend to go up, the proposed numbers in sample tend to go down, and the sampling errors of sample estimates tend to get larger.

For illustrative purposes, we have taken the specific number of completions reported for fiscal year 1975 and proposed sampling rates based on those numbers. It is quite possible, however, that when some States are about to initiate the ongoing survey, they will already know that the current size of their training programs, measured in terms of completions, is substantially larger or smaller than the reported 1975 number. In that event,

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[3] Department of Health, Education, and Welfare, Data Management Center, Enrollments in Vocational Programs - FY 1975, Washington, D.C. 1975.

Table 1. State sampling rates proposed for the followup of former vocational education students, showing the numbers of response expected*, and the sampling error** of a characteristic that accounts for 50 percent of completions. (Proposed sampling rates based on number of completions in fiscal year 1975).

State	Number enrollments FY 1975	Number completions FY 1975	Proposed (i.e., assumed) sampling rate	Expected number completions in sample	Expected number followup responses (response rate = .80)	Sampling error of 50.0 percent characteristic (absolute percents)	Estimated number ± sampling error
Alabama	244,813	24,804	1 in 8	3,101	2,481	1.00	12,402± 248
Alaska	26,894	5,362	1 in 4	1,341	1,073	1.53	2,681± 82
Arizona	201,388	24,634	1 in 8	3,087	2,470	1.01	12,347± 249
Arkansas	148,175	13,338	1 in 6	2,223	1,778	1.19	6,669± 159
California	1,664,684	503,750	1 in 50	10,075	8,060	.56	251,875±2821
Colorado	122,784	36,961	1 in 10	3,696	2,957	.92	18,481± 340
Connecticut	256,417	22,097	1 in 7	3,157	2,526	1.00	11,049± 221
Delaware	64,523	5,025	1 in 4	1,456	1,165	1.46	3,913± 85
District of Col.	17,744	2,138	1 in 3	713	570	2.09	1,069± 45
Florida	917,368	89,415	1 in 19	4,706	3,765	.81	44,708± 724
Georgia	447,761	58,619	1 in 14	4,187	3,350	.86	29,310± 504
Hawaii	53,010	7,716	1 in 5	1,543	1,234	1.42	3,858± 110
Idaho	42,161	5,551	1 in 4	1,388	1,110	1.50	2,776± 83
Illinois	1,604,889	131,810	1 in 25	5,272	4,218	.77	65,905±1015
Indiana	174,698	45,988	1 in 11	4,181	3,345	.86	22,994± 395
Iowa	297,877	14,838	1 in 6	2,473	1,978	1.12	7,419± 166
Kansas	110,113	32,484	1 in 9	3,609	2,887	.93	16,242± 302
Kentucky	227,870	33,889	1 in 9	3,765	3,012	.91	16,945± 308
Louisiana	213,378	33,836	1 in 9	3,760	3,008	.91	16,918± 308
Maine	74,980	16,903	1 in 8	2,817	2,254	1.05	8,452± 177
Maryland	257,257	21,386	1 in 7	3,055	2,444	1.01	10,693± 216
Massachusetts	199,064	34,169	1 in 9	3,797	3,038	.91	17,085± 314
Michigan	433,751	100,391	1 in 20	5,020	4,016	.79	50,196± 793
Minnesota	331,090	60,618	1 in 14	4,330	3,464	.85	30,309± 515
Mississippi	175,561	17,198	1 in 6	2,866	2,293	1.04	8,559± 179
Missouri	192,380	27,568	1 in 8	3,446	2,757	.95	13,784± 262
Montana	40,486	19,861	1 in 7	2,837	2,270	1.05	9,931± 209
Nebraska	93,363	13,283	1 in 6	2,214	1,771	1.19	6,642± 158
Nevada	32,658	12,068	1 in 6	2,011	1,609	1.25	6,034± 151
New Hampshire	64,684	6,722	1 in 4	1,681	1,345	1.36	2,361± 91
New Jersey	456,284	66,312	1 in 15	4,421	3,537	.84	33,156± 557
New Mexico	54,549	17,730	1 in 6	2,955	2,364	1.03	8,865± 183
New York	1,000,021	141,260	1 in 26	5,433	4,346	.76	70,630±1074
North Carolina	639,372	49,683	1 in 12	4,140	3,312	.87	24,842± 432
North Dakota	52,382	8,129	1 in 5	1,626	1,301	1.39	4,065± 113
Ohio	698,959	232,292	1 in 35	6,637	5,310	.68	116,146±1580
Oklahoma	132,235	41,327	1 in 10	4,133	3,306	.87	20,664± 360
Oregon	179,255	16,942	1 in 6	2,824	2,260	1.05	8,471± 178
Pennsylvania	399,320	96,536	1 in 20	4,827	3,862	.80	48,268± 772
Rhode Island	37,886	3,657	1 in 3	1,219	975	1.60	1,829± 59
South Carolina	245,011	22,823	1 in 7	3,260	2,608	.98	11,412± 224
South Dakota	31,472	5,913	1 in 4	1,478	1,182	1.45	2,957± 86
Tennessee	196,645	39,684	1 in 10	3,968	3,174	.89	19,842± 353
Texas	912,236	156,959	1 in 28	5,606	4,485	.75	78,480±1177
Utah	165,962	22,148	1 in 7	3,164	2,531	.99	11,074± 219
Vermont	22,798	3,522	1 in 3	1,174	939	1.63	1,761± 57
Virginia	424,877	48,203	1 in 12	4,017	3,214	.88	24,102± 424
Washington	321,578	41,127	1 in 10	4,113	3,290	.87	20,564± 358
West Virginia	93,552	11,668	1 in 6	1,945	1,556	1.27	5,834± 148
Wisconsin	347,363	30,285	1 in 9	3,365	2,692	.96	15,143± 291
Wyoming	21,752	4,753	1 in 4	1,188	950	1.62	2,377± 77
American Samoa	0	0	--	--	--	--	--
Guam	3,235	253	1 in 1	253	202	3.52	127± 9
Puerto Rico	166,612	23,550	1 in 7	3,364	2,691	.96	11,775± 226
Trust Territory	0	0	--	--	--	--	--
Virgin Islands	5,243	331	1 in 1	331	265	3.07	166± 10

* Based on an assumed response rate of 80 percent.

** Sampling error = 1 standard error.

Table 2. State sampling rates proposed for the followup of former vocational education students, showing the numbers of response expected*, and the sampling error** of a characteristic that accounts for 50 percent of completions. (Proposed sampling rates based on number of completions in fiscal year 1975).

State	Number enrollments FY 1975	Number completions FY 1975	Proposed (i.e., assumed) sampling rate	Expected number completions in sample	Expected number followup responses (response rate = .80)	Sampling error of 50.0 percent characteristic (absolute percents)	Estimated number ± sampling error
California	1,664,684	503,750	1 in 50	10,075	8,060	.56	251,875±2821
Ohio	698,959	232,292	1 in 35	6,637	5,310	.68	116,146±1580
Texas	912,236	156,959	1 in 28	5,606	4,485	.75	78,480±1177
New York	1,000,021	141,260	1 in 26	5,433	4,346	.76	70,630±1074
Illinois	1,604,889	131,810	1 in 25	5,272	4,218	.77	65,905±1015
Michigan	433,751	100,391	1 in 20	5,020	4,016	.79	50,196±793
Pennsylvania	399,320	96,536	1 in 20	4,827	3,862	.80	48,268±772
Florida	917,368	89,415	1 in 19	4,706	3,765	.81	44,708±724
New Jersey	456,284	66,312	1 in 15	4,421	3,537	.84	33,156±557
Minnesota	331,090	60,618	1 in 14	4,330	3,464	.85	30,309±515
Georgia	447,761	58,619	1 in 14	4,187	3,350	.86	29,310±504
N. Carolina	639,372	49,683	1 in 12	4,140	3,312	.87	24,842±432
Virginia	424,877	48,203	1 in 12	4,017	3,214	.88	24,102±424
Indiana	174,698	45,988	1 in 11	4,181	3,345	.86	22,994±395
Oklahoma	132,235	41,327	1 in 10	4,133	3,306	.87	20,664±360
Washington	321,578	41,127	1 in 10	4,113	3,290	.87	20,564±358
Tennessee	196,645	39,684	1 in 10	3,968	3,174	.89	19,842±353
Colorado	122,784	36,961	1 in 10	3,696	2,957	.92	18,481±340
Massachusetts	199,064	34,169	1 in 9	3,797	3,038	.91	17,085±311
Kentucky	227,870	33,889	1 in 9	3,765	3,012	.91	16,945±308
Louisiana	213,578	33,830	1 in 9	3,760	3,008	.91	16,918±308
Kansas	110,113	32,484	1 in 9	3,609	2,887	.93	16,242±302
Wisconsin	347,363	30,285	1 in 9	3,365	2,692	.96	15,143±291
Missouri	192,380	27,568	1 in 8	3,446	2,757	.95	13,784±262
Alabama	244,813	24,804	1 in 8	3,101	2,481	1.00	12,402±248
Arizona	201,388	24,694	1 in 8	3,087	2,470	1.01	12,347±249
Puerto Rico	166,612	23,550	1 in 7	3,364	2,691	.96	11,775±226
S. Carolina	245,711	22,823	1 in 7	3,260	2,608	.98	11,412±224
Utah	165,962	22,148	1 in 7	3,164	2,531	.99	11,074±219
Connecticut	256,417	22,097	1 in 7	3,157	2,526	1.00	11,049±221
Maryland	257,257	21,386	1 in 7	3,055	2,444	1.01	10,693±216
Moncana	40,486	19,861	1 in 7	2,837	2,270	1.05	9,931±209
New Mexico	54,549	17,730	1 in 6	2,955	2,364	1.03	8,865±183
Mississippi	175,561	17,198	1 in 6	2,866	2,293	1.04	8,559±179
Oregon	179,255	16,942	1 in 6	2,824	2,260	1.05	8,471±178
Maine	74,986	16,903	1 in 6	2,817	2,254	1.05	8,452±177
Iowa	297,877	14,838	1 in 6	2,473	1,978	1.12	7,419±166
Arkansas	148,175	13,338	1 in 6	2,223	1,778	1.19	6,669±159
Nebraska	93,363	13,283	1 in 6	2,214	1,771	1.19	6,642±158
Nevada	32,658	12,068	1 in 6	2,011	1,609	1.25	6,034±151
West Virginia	93,552	11,668	1 in 6	1,945	1,556	1.27	5,834±148
North Dakota	52,382	8,129	1 in 5	1,626	1,301	1.39	4,065±113
Hawaii	53,010	7,716	1 in 5	1,543	1,234	1.42	3,858±110
New Hampshire	64,684	6,722	1 in 4	1,681	1,345	1.36	2,361±91
South Dakota	31,472	5,913	1 in 4	1,478	1,182	1.45	2,957±86
Delaware	64,523	5,825	1 in 4	1,456	1,165	1.46	3,913±85
Idaho	42,161	5,551	1 in 4	1,388	1,110	1.50	2,776±83
Alaska	26,894	5,362	1 in 4	1,341	1,073	1.53	2,681±82
Wyoming	21,752	4,753	1 in 4	1,188	950	1.62	2,377±77
Rhode Island	37,886	3,657	1 in 3	1,219	975	1.60	1,829±59
Vermont	22,794	3,522	1 in 3	1,174	939	1.63	1,761±57
Dis. of Col.	17,744	2,138	1 in 3	713	570	2.09	1,069±45
Virgin Islands	5,243	331	1 in 1	331	265	3.07	166±10
Guam	3,235	253	1 in 1	253	202	3.52	127±9
Amer. Samoa	0	0	--	--	--	--	--
Trust Terr.	0	0	--	--	--	--	--

* Based on an assumed response rate of 80 percent.

** Sampling error = 1 standard error.

Table 2 can be helpful in terms of modifying the proposed sampling rate to conform to the changed conditions.

As a hypothetical example, suppose that Connecticut is ready to initiate the survey, but now expects some 25,000 completions annually, rather than the 22,097 reported for fiscal 1975. Thus, Connecticut's current expectation is roughly the number of completions reported by Alabama for fiscal 1975. In this situation, the proposed sampling rate for Connecticut should be 1 in 8 (as shown for Alabama) rather than 1 in 7 (as shown in Connecticut). Correspondingly, if the training programs in Connecticut have declined so that only about 15,000 completions are expected in a year, then the proposed sampling rate for Connecticut should be 1 in 6 (see Iowa).

The sampling rates and the sample sizes proposed in Tables 1 and 2 should not be regarded as absolutes, to be adopted unquestioningly by any State planning an ongoing followup survey. Rather, the rate and size proposed for a specified total volume of completions represent a judgment of what may be a reasonable compromise between the conflicting considerations of cost and reliability.

What we are recommending is that the State initially consider the proposed sampling rate derived from the tables and evaluate the expected costs of a survey of that size and the reliability of the important estimates to be derived from the survey. If both survey cost and estimate reliability are found to be reasonably satisfactory, then the proposed sampling rate should be adopted. If, on the other hand, the sampling errors associated with the proposed sampling rate are considered undesirably high, then Table 2 should be consulted to see what sample size is needed to produce acceptably-low sampling errors; this alternative sample size should then be evaluated in terms of cost, both to be sure that the total cost is feasible, and that the increased cost (as compared with the proposed sample size) is not disproportionate to the amount improvement in precision. Similarly, if the survey costs associated with the proposed sampling

rate are considered undesirably high, then an alternative should be considered based on costs that would be acceptably low; this alternative sample size should then be evaluated in terms of reliability, both to be sure that sample estimates can still be defended as precise enough for survey purposes, and that the net loss in reliability (as compared with the proposed sample size) is more than balanced by the cost savings.

When the annual number of completions is small, there is relatively little scope for savings by using sampling. Note, as extreme examples, that Guam reported on 253 completions during fiscal year 1975, and the Virgin Islands reported only 331. In these two instances, we propose a followup of all eligible former students (i.e., no sampling). Even 100 percent followup of completions in Guam and the Virgin Island will provide only a small amount of data, and these data will permit only a very limited analysis.

We have no information on the numbers of leavers by States, or concerning the relationship of the numbers of leavers to numbers of completers. If a sample of "1 in n" is drawn as suggested earlier in a State, the sample will produce that same fraction of completers and leavers. Thus, if leavers in a year are approximately equal to completers, the sample size for leavers will be the same as shown for completers in Tables 1 and 2. Or it will be correspondingly higher or lower if the total number of leavers is correspondingly larger or smaller than the total number of completers. We tentatively recommend the retention of the same sampling fraction for leavers as for completers, but this may be found to yield an unnecessarily large sample of leavers, in which event the initial sample of leavers can be "thinned" by taking one-half, or one-third, or some other fraction of the initially selected sample of leavers as the final sample of leavers to be followed up. If leavers are a relatively small fraction of completers, the sample of leavers will be small. But if there are relatively few leavers

then leaving would constitute a small problem, and it appears that there would be little interest in enlarging the sample for them.

3.3 Reliability of Sample Estimates

Suppose it were possible to take a given population, hold its essential characteristics unchanged, and survey it repeatedly, making independent sample selection but in all other respects following the same set of survey procedures and conditions. Clearly, if the proportion of the population having a specified characteristic were estimated from each sample, those estimates would differ. How much they would differ is important, since, if they cluster closely together, any one estimate comes reliably close to the expected value of all estimates; whereas, if these estimates are widely scattered, then any one estimate must reasonably be regarded as correspondingly unreliable in representing the overall expected value.

3.3.1 Sampling Error of 50.0 Percent

If a State bases its followup survey on a probability sample of enrollees, using the systematic selection procedure described earlier in this chapter, then the reliability of its sample estimates will be computable from the standard statistical formulas. This reliability can be measured in terms of sampling error (sometimes referred to as the standard error of sampling). To help States to evaluate the reliability of the proposed samples of completions, the last 2 columns of Tables 1 and 2 give the sampling error of a 50 percent characteristic -- column 6 gives the sampling error in percentage terms, column 7 shows the estimated number (i.e., 50

percent of all completions) followed by the sampling error shown as a number.[4]

To illustrate the use of the reliability measures provided in Tables 1 and 2, let us see how reliable the sample proposed for Idaho would be (1,110 expected followup responses) in estimating a given characteristic of completers that has an expected value of 50.0 percent. The sampling error (one standard error) for Idaho (column 6) is 1.50 percent. Consequently, it is likely[5] that the sample estimate for the given characteristic will fall between 50 plus 1.50 and 50 - 1.50, that is, between 48.50 percent and 51.50 percent. Correspondingly, since Idaho reported 5.551 completions in fiscal 1975, it is likely[6] that the estimated number of completers with the given characteristic would fall somewhere in the range between 2,693 and 2,959 (see column 7).

More conservatively speaking, it is almost sure that a specified sample estimate will be closer than 2 sampling errors to the expected value of that estimate. Thus, it is almost sure, for the proposed Idaho sample, that a characteristic of completions with expected value of 50.0 would be estimated somewhere between 47.0 and 53.0 percent.

The sampling errors given in Tables 1 and 2 are for a characteristic that accounts for 50 percent of the completers in each State, where the sample sizes are as shown. We cannot give a corresponding figures for leavers for each State because, as

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[4] Column 6 is based on the formula $\frac{P\%}{n}$, when p = q = 50.0 percent and n = expected number of responses (column 5). The sampling error in column 7 = $\frac{\text{Column 6}}{100}$ x (Column 2).

[5] The probability is about 68 percent that a specified sample estimate will be closer than 1 sampling error to the expected value of that estimate.

[6] The probability is about 95 percent.

indicated above, we do not have information on the numbers of leavers. However, the above results (and those presented in the next two sections) are directly applicable to samples of leavers. One simply identifies the size of sample of completers, in Table 1 (in whatever State) that corresponds approximately to the sample actually obtained and used for leavers in some other state. The sampling error of an estimated percentage for a characteristic that accounts for 50 percent of the leavers will be the same as for the same size of sample for completors.

3.3.2 Sampling Error of a Percent Not Equal to ($\neq$) 50.0

In absolute terms, the sampling error of a percentage is a maximum when the expected value of the percentage is 50.0 percent. The sampling error is smaller for any other percentage -- whether that percentage is larger than 50.0 percent, or smaller. How much smaller the sampling error becomes is indicated in relative terms by column 2 of Table 3. Thus, for a 40.0 percent characteristic, the relative size of the sampling error is shown as .98; this means that the sampling error of a 40.0 percent characteristic is 2 percent smaller than the sampling error of a 50.0 characteristic. Note that the relative errors shown in Table 3 are constant, i.e., <u>not</u> dependent on sample size. Consequently, if we wished to present sampling errors for a 15.0 percent characteristic for all samples presented in Tables 1 or 2, it would be necessary to multiply .71 by the figure in column 6, for each State.

Let us carry the Idaho example one step further. If a given characteristic of completers in Idaho has an expected value of 20.0 percent, then its sampling error will be 1.20 percent (i.e., .8 x 1.50). Consequently, it is likely that the sample estimate will fall between 18.80 percent and 21.20 percent.

Table 3. Relative size of sampling error for a simple random sample of completors (or leavers), where a specified percent of completors (or leavers) has a given characteristic.*

(Base: Random sampling error of a 50 percent characteristic = 1.00)

Percent of total population of completors (or leavers) with given characteristic (100 p)	Sampling error relative to corresponding sampling error of a 50 percent characteristic
50.0	1.00
40.0 or 60.0	.98
30.0 or 70.0	.92
25.0 or 75.0	.87
20.0 or 80.0	.80
15.0 or 85.0	.71
10.0 or 90.0	.60
5.0 or 95.0	.44
1.0 or 99.0	.20

For values of "100 p" not provided in this table, apply the formula:

$$\text{Relative sampling error} = 2\sqrt{p\,(1-p)}$$

To illustrate: the relative sampling error of a 3.0 percent chacteristic =

$$2\sqrt{(.03)(.97)} = .34$$

*See text (Section 3.3) for discussion of how this table is used in evaluating the reliability of a given size of random sample.

Correspondingly, the estimated number of completers with the given characteristic would be likely to fall somewhere in the range between 1,044 and 1,177 (i.e., between .188 x 5,551 and .212 x 5,551).

Because it does not depend on sample size, Table 3 is applicable to samples for leavers as well as for completers.

3.3.3 Sampling Error of a Purely Descriptive Estimate

The sampling error of a statistical estimate may be somewhat different, depending on whether the estimate is being used for analytical or for purely descriptive purposes. In terms of a followup study of former students, for example, the use of the statistics would be purely descriptive if what is being estimated are simple numerical facts (e.g., the number of female vocational education students who left school between September 1976 and September 1977 without completing the program) without any attempt to evaluate a fact as "good" or "bad", or to explain what may have caused a number to be so high or so low. The use of the statistics is analytical when the summary of findings involves delving into possible causal relationships, such as the expected success rate on jobs of completers for a given program of training.

As we understand it, the principal motivation for the followup survey is analytical, since the basic purpose of the mail questionnaire is to relate the former student's vocational training to his work experience since leaving school. Consequently, it is our expectation that ordinarily the results of a followup survey will be used for analytical purposes.

In case the need to evaluate the sampling error of a descriptive estimate should arise, Table 4 has been provided.

The sampling error for an estimate used descriptively is always smaller (perhaps trivially so) than the same estimate used analytically. Note that column 2, Table 4 shows how much smaller the descriptive estimate is than the analytical in relative terms. Thus, for a State with a sampling rate of 1 in 10, the relative size of the sampling error for a descriptive estimate is shown as .95; this means that, when 1/10 of the existent population is in sample, the sampling error of a descriptive estimate is 5 percent smaller than the corresponding sampling error of an analytical estimate.

In the Idaho example, you will recall that, for a given characteristic of completers with an expected value of 20.0 percent, the sampling error was computed to be an absolute 1.20 percent. This sampling error applies to an analytical estimate. If Idaho is making this estimate for purely descriptive purposes, then -- since the proposed sampling rate for Idaho is 1 in 4 -- the sampling error would only be 1.04 percent (i.e., .87 x 1.20).

Table 4. Size of sampling error of a descriptive* estimate of a population of completors, based on a simple random sample, relative to the corresponding analytical* estimate.

Fraction of total population of completors included in sample (f)	Sampling error of a descriptive* estimate relative to corresponding sampling error of an analytical* estimate
1/100	.995
1/10	.95
1/7	.93
1/6	.91
1/5	.89
1/4	.87
1/3	.82
1/2	.71
Entire population in sample	.00

For a value of "f" not provided in this table, apply the formula:

$$\text{Relative sampling error} = \sqrt{1-f}$$

To illustrate: the relative sampling error of a descriptive estimate, when 1/25 of the total population is in sample

$$= \sqrt{24/25} = .98$$

*For discussion of difference between a descriptive and an analytical estimate, see Section 3.3.3.

4. APPROXIMATE COSTS FOR THE PROPOSED ONE-STAGE SURVEY DESIGN

Any indications of costs that we can give must be very rough at this time. Actual costs will vary depending on questionnaire content and the way the procedures are carried through for a given survey design. Moreover, useful costs estimates can be made only after some preliminary testing. Nevertheless, we give very tentative cost estimates as a guide to the order of magnitudes of the costs that may be involved. These are speculated on the basis of experience in other studies.

We suggest as a first rough approximation a cost function for the one-stage survey design we have suggested in which all eligible schools are included in the sample within the State as follows:

$$C = C_o + C_1 m + C_2 n$$

where:

m is the number of schools included in the State sample;

n is the average number of completers and leavers in the State sample.

C_o represents overhead costs that do not vary with the size and design of the sample survey;

C_1 is the unit cost per eligible school in the State. All such schools are included in the sample. C_1 represents unit costs associated with the number of schools that must be contacted and from which information must be obtained.

C_2 is the unit cost per student completer or leaver included in the sample.

We make no serious attempt at this time to suggest the magnitude of C_o, the overhead costs for the study that are substantially invariant with the design and size of sample within a State, except to suggest that much of this cost might be absorbed by existing State personnel. As a very rough guide we suggest that C_o, might be of the order of \$10,000 to \$25,000. We suggest as very rough approximations that C_1= \$50 and C_2 = \$25.

If these figures are assumed, the annual costs in a State with 200 eligible schools and a sample of about 2,000 completers and 1,000 leavers would be of the magnitude of

$$C - C_o = \$50m + \$10n = 50(200) + 25(3000) = \$85,000$$

These costs, as we indicated previously, are very tentative in nature and can be refined after gaining some experience in the actual conduct of the surveys in a few States. However if costs are a critical factor within the design requirements of a State, then changes in sample size would have obvious cost implications. The assumed unit costs can be varied to account for local conditions in various States and these, as well as changes in sample size, will affect aggregate cost estimates.

Each State might very well institute its own cost efficiencies that will impact on the actual costs in their State. The figures provided in this chapter, therefore, are intended only to provide an initial general framework for the estimation of possible orders of magnitude of survey costs.

5. INSTRUMENT DEVELOPMENT

The focus of this chapter will be on the content of the three instruments to be used in the study - the background questionnaire, the student followup questionnaire and the employer instrument. It's important to keep in mind that the States may want to modify these instruments so that the information may be more compatible with their own individual needs and interests. However, it must be stressed to the individual States that there is certain baseline information which must be reported to the Federal government if the States are going to meet the requirements of the new legislation. Thus, the States should be aware that although they may add to the questionnaire if they wish, they must not delete any basic items, otherwise there will be gaps in the data being reported and the information from their State will not be compatible with information coming from other States.

The instruments that we are proposing here are ones which would be most appropriately used in the three year cycle of development that we have proposed earlier in Chapter 2. This three year cycle assumes that the initial student background questionnaire will be administered soon after the student has been identified for the study and that the student followup and the employer questionnaire will be administered approximately one year after the student has left the program. States that need followup data sooner than the initial three year period in our plan may follow the interim procedures which are discussed in Appendix B. Then some modifications to the instrument design may be needed. However, these are minimal and we would certainly be happy to work with BOAE, NCES and others to help in the modification of the instrumentation.

Our intent in this chapter was not to recommend anything which we felt would substantially increase the respondent burden at

the State level. We have reviewed numerous instruments that are currently being used for followup in many of the States and although we could come up with a composite that would provide all the desirable information, we do not feel this is necessary. After reviewing the VEDS questionnaires very carefully, we feel that the information that they are requiring would provide substantially all the information needed for States to comply with the requirements of the legislation.[7] Therefore, we are recommending that there not be any additional instrumentation developed specifically for this followup study. Not only do we feel that the VEDS questionnaire will suffice for the followup requirements, but if the VEDS system sends out one set of instrumentation and the followup study requires another set, we feel that this would be counter-productive, causing a great deal of concern among States, schools, students and employers and would result in the end, in considerable difficulty in getting responses. This of course would have a significant impact on the cost and final analysis of the program.

However, since the VEDS questionnaires have not been finalized, there are several recommendations which we would make for modification to these instruments that we feel would add to the overall quality of the analysis. In the study followup form, it is important to get some idea of whether or not the student felt the training they had received was relevant for the work in which they are employed. Although VEDS does include a question related to this, we would recommend the addition of a question which goes beyond the VEDS one, such as the following:

Did or does your first job -

1. Make full or extensive use of the vocational training received

[7]See Appendix D for the items currently included in the VEDs questionnaire.

2. Make some use of the vocational training received

3. Make little or no use of the vocational training received

This will give us some perception of the student's feelings toward the relevancy of their training while in school. This can then be compared to the employer's assessment of whether that particular employee has the skills that may be necessary, or that the employer feels will be necessary, to carry out the requirements of their particular job. This will be helpful in assessing how effective the vocational training was for that particular student.

Another change that we would recommend is that the student questionnaire make some provision for indicating the student's approval to contact an employer. It would be valuable to have this piece of information approved by each student on the form itself. This will provide a formal record.

On the background questionnaire we would recommend the following additions:

- Student's purpose in enrolling in designated vocational program

  (a) To improve knowledge or skills in field;

  (b) To qualify for a job in field in which student has had no previous work experience;

  (c) Other: (please specify)

- It may be a year or more after you leave school before the followup questionnaire will be sent to you. In the meantime you may have moved -- perhaps several times. We shall appreciate it if you will give us the name, address, and telephone number of a relative or friend, who, in case we have a problem in locating you, will probably be able to help us.

This later question would replace the existing one in the questionnaire because we feel it would be too easy for the student to misinterpret who that contact person should be. Since this can be an extremely critical item, we want to be certain that no mistakes are made and feel the proposed question would help to clarify the response needed.

The employer questionnaire ought to include a question to ascertain to what extent the student uses prior training for this job.

One other factor which should be kept in mind in developing these forms is that many States will be very reluctant to go to employers for followup without asking students' permission. Without an employer followup it will be almost impossible to determine the total effectiveness of the vocational programs in a particular State. Therefore, this issue must be resolved prior to the recommendation of any sample followup plan. When the followup task force of NCES met some months ago, this particular issue became extremely relevant to the data collection activity when it was found that many States would not send an employer form out unless the student allowed or gave permission to the school to do this. If OE is going to follow this procedure, then one possibility is that it be done very early in the followup process. It might be desirable to get the students' permission while they are still enrolled in the vocational program in school. It is possible that at the time of actual employment, the student may be concerned that an inquiry of his/her employer would be undesirable. Consequently, we feel that the release should be requested in the student followup questionnaire. It is important to reassure the student that this kind of information will in no way be used for job promotion or will not have any effect on the student's work history. This information will not follow the student around from job to job and will only be used to determine overall effectiveness of the vocational education programs of a particular State.

Any questions which are designed to be used for this followup study must be carefully field tested before they are used. Misunderstanding the questions can be a very common problem and is often one of the causes for a low return rate. It is important that these questions are easy to complete, require a minimum amount of time, and do not have any ambiguities or items which the respondent may think are personal. We, therefore, recommend that a field test of both the student and employer instrument be conducted in at least two States. This would provide feedback on any items that might be causing some problem either because of poor wording or because of student's or employer's negative reaction to those particular items.

If the VEDS instruments are not going to be field tested by NCES, then we would strongly recommend that BOAE conduct their own field test of these questionnaires prior to recommending their use in the followup study. This will provide a clean set of instruments which should result in higher completion rates and a more efficient followup program.

6. ACHIEVING A HIGH RESPONSE RATE FROM THE MAIL QUESTIONNAIRE

As was discussed earlier[8], the first steps to get the cooperation of former students in returning followup questionnaires are taken long before the actual mail-out. A major purpose for the initial contact with the student, while still in school, is to prepare he/she to expect the followup, and, hopefully, to condition them to respond.

This initial contact with the student in school, however, should not be relied on to produce a satisfactory response rate. Therefore, we are recommending the following procedures that we feel will help to increase the responses to the questionnaire. About three weeks after the initial mail-out, the numbers of completed questionnaires still coming in should have dwindled down to nothing -- or to a mere trickle. At that point, the first followup questionnaire should be mailed to nonrespondents. After about three weeks more, those who are still nonrespondents should be sent a second followup. Finally, an attempt should be made to reach and interview by telephone those who do not respond to any of the three mailings. If a telephone number for the nonrespondent is not found then help in contacting the former student should be sought from the person listed as likely to know the students whereabouts.[9]

It is our judgment that, with the recommended set of procedures for getting the cooperation of former students, each State will find that an 80 percent response rate is a feasible goal, and, hopefully, a fair number of States will be able to better that figure.

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[8] See section on background questionnaire, Chapter 5.

[9] In some instances, a Pastmaster return will indicate that mail cannot be delivered to the former student at the given address. In these cases, the person listed as likely to know the current whereabouts of the former student (see background questionnaire) should be contacted.

Obviously, followup, when effective, simultaneously increases the number of responses and the response rate. Note, however, that the increase in the number of responses is of only secondary value to the survey -- the primary objective of followup is to obtain responses from a high proportion of those former students that were selected for the sample.

It can be a serious error to focus on obtaining a given number of responses, if it is done without regard for the response rate. Let us take Michigan data to illustrate this point:

> For fiscal 1975, Michigan reported 100,391 completions. At the proposed sampling rate (1 in 20), the Michigan sample would include some 5,000 completions. We have assumed that, using background questionnaires, three mailings, and a final telephone followup, Michigan should be able to achieve at least an 80 percent response rate (i.e., more than 4,000 completed followup questionnaires).
>
> Suppose now, that Michigan learns that, dispensing with all the supporting procedures, a single mailing of the followup questionnaire can expect a 40 percent return. It is, therefore, apparent that by starting with an original sample of 10,000 (rather than 5,000) completions, Michigan could obtain about 4,000 completed questionnaires without followup.
>
> This simplified procedure probably would cost less in total, and undoubtedly would produce 4,000 returns more quickly than the followup system we are proposing. Why should the short-cut not be taken.

The answer lies in a difference in quality between data produced by the two survey methods -- a difference that is likely to render the results of a survey with a 40 percent response rate so inaccurate as to be quite misleading. The inaccuracy comes from the fact that those who cooperate readily in completing a mail questionnaire cannot be treated as representative of the population being surveyed; they are likely to have special characteristics, different from those who are more reluctant to cooperate.

As between response rates -- all less than 100 percent -- the difference in quality of data is one of degree rather than a difference in kind. Nevertheless, this difference in degree can be extremely important. Thus, if a survey stops with a 40 percent response, the number of nonresponding sample students is 1 1/2 times the number responding; if there are important differences between the characteristics of the two groups these differences can strongly bias the sample estimates because of the sheer size of the omitted group. On the other hand, if a survey achieves an 80 percent response, then the nonresponding number is only a fourth the number responding; differences between respondents and of nonrespondents will still exist, and the omission of nonrespondents will still tend to bias sample estimates, but the effect of the differences will be dampened because the omitted group is much smaller than the respondent group.

In summary, the States should understand that, inasmuch as they can never expect to get returns from 100 percent of their mail questionnaires, the sample estimates will be affected to some degree by nonresponse biases. However, as long as the percentage of the sample that is nonresponse remains reasonably small, the amount of the bias effect on sample estimates can be kept reasonably low. If the response rate comes up to at least 80 percent, then, in our judgment, the potential bias effect will not be dangerously high.

7. PROCEDURES FOR ANALYSIS OF SURVEY RESULTS

After the field phase has been successfully completed, all data for the given followup sample should be tabulated for study.

Data from the background questionnaires for the complete followup sample can make an important contribution to the analysis. These data should include nonrespondents to the mail questionnaire as well as respondents. If, as expected, there is little or no nonresponse to the background questionnaire, then all characteristics of the followup sample that are available in the background questionnaire should be estimated from that source, rather than from the mail questionnaire. Further, the background questionnaires can provide a distribution of characteristics for nonrespondents to the mail questionnaire. The fact that the survey achieves an overall response rate above 80 percent will not necessarily mean that the results have been equally satisfactory for all sectors of the sample. For example, those who have left programs without finishing may feel that questions on use of vocational training are not pertinent for them, and therefore they may feel less obligation to respond. If, in fact, response rates are found to be unsatisfactorily low for leavers -- or for another sector of the sample -- then results for this sector of the sample should emphasize the information obtained from the background questionnaires. If any in depth analysis of this sector is attempted it should be highly qualified.

For any analysis of post-school use of vocational training, the difference between completers and leavers is so basic as to require a separation of statistics, even when the sample size for one of these groups is too small to give reliable estimates. Except for the break between completers and leavers, the amount

of detail in State analyses should be limited by the size of the sample.

When the number of completer responses is very small (say, less than 500), only very simple analysis may prove useful, -- primarily one-way distributions of total completors (or total leavers) with each distribution showing only major classifications. For example, one distribution might identify the main demographic categories of completers, another provide a breakdown between major training programs, another report on work situation at time of followup, etc. At this level, statistical estimates might be either the total number or the percent of all completers (or of all leavers) having a specified characteristic. The reliability of any estimate should be provided, either in a table or in the text of the report.

States with larger samples of completers will be able to examine their returns in somewhat greater detail, -- looking separately at certain major subsets of completers, or perhaps, cross-classifying some distributions. The important point that needs to be stressed is that the scope for detailed analysis does not suddenly and mysteriously appear when the sample size passes a designated number. Rather, a growing sample number provides an increasing amount of information, spread over the various parts of the sampled population. At low sample levels, it is less meaningful to examine the population part by part -- the available information is too thin. As the sample grows larger, however, it becomes increasingly possible to look for meaningful detail -- at one sample size, a given subset may become large enough to be studied separately; at a somewhat larger sample size, several other subsets may be profitably examined.

States will need guidance -- in terms more specific than the preceding paragraph -- in deciding how far they may justifiably go in computing estimates of the characteristics for subsets

of the completer and leaver populations, and in comparing one subset with another. Reliability of subset sample estimates should be the prime criterion for determining whether separate detail is provided for subsets of the completer sample. In other words, a separate breakdown for a subset may not be useful unless that breakdown provides meaningful information (i.e., at lease some of the cells in a distribution are reasonably reliable in terms of sampling error).

There are two basic considerations in evaluating the reliability of statistics for subsets: (1) the effect on sampling error of estimating a characteristic for a subset of completers rather than for all completers, and (2) the effect on sampling error of comparisons between subsets, or between a subset and the rest of the population.

In shifting from a characteristic of all completers or leavers to a characteristic of a subset of completers or leavers, the important difference in computing sampling error comes from the fact that the sample size has dropped from the total sample of completers to the sample number of completers in the subset.

> To illustrate this point, suppose that California adopts the proposed sampling plan, and does in fact carry out a followup study, resulting in about 8,000 filled-out mail questionnaires from completers in sample. Suppose, further, that 200 of the 8,000 completers got their training in accountancy, and that, at the time of the followup, 100 of the 200 (i.e., 50 percent) were currently employed as accountants. It should be immediately apparent that the sample estimate of 50 percent is based on only 200 observations, and, consequently, the reliability of that estimate is only as good as a sample of 200, not a sample of 8,000. It follows, therefore, that the sampling error of the 50 percent estimate for California's trained accountants would be 3.5 percent (about the same as Guam's sampling error for a total of 202 followup responses -- see Table 2).

Rarely is a characteristic estimated just for one subset within a population. Almost inevitably, estimates for a subset are used comparatively -- even if the comparison is just between that subset and the rest of the population. Typically, what is being compared are two estimates, each based on independent sample observations, and, therefore, each subject to an independent sampling error. Under these circumstances, the difference between the two estimates being compared will also have a sampling error, larger than the sampling error of either estimate taken by itself. Given the sampling error of each estimate, the sampling error of the difference between the estimates is computable by a simple mathematical formula.

Assume that, for a specified subset of the completer population in State X, the proportion having a given characteristic is estimated as p_1, with a sampling error of σ_1. Assume further that, in another subset in State X the proportion with the given characteristics is estimated as p_2, with a sampling error of σ_2. In this case, the sampling error of the difference between p_1 and p_2 (i.e., σ_{1-2}) can be computed as:

$$\sigma_{1-2} = \sqrt{\sigma_1^2 + \sigma_2^2}$$

To illustrate the computation of the sampling error of a difference, suppose that a followup sample for Louisiana (total completer responses 3,008) includes 570 persons who completed an agricultural training program, and another 1,073 who completed an office training program. At the time of followup, 20 percent of those office trained were unemployed as compared with 30 percent of those with agricultural training. The example which follows shows how to compute the sampling error of the difference of 10 percentage points.

The sampling error of the 20 percent estimate is 1.22 (i.e., 1.53 x .8, see line for Alaska in Table 2, and the relative sampling error for 20 percent characteristics in Table 3). The sampling error of the 30 percent estimate is 1.92 (i.e., 2.09 x .92, see line for District of Columbia in Table 2, and the relative sampling error for 30 percent characteristics in Table 3). The sampling error of the 10 point difference is computed as follows:[10]

$$\sigma_{1-2} = \sqrt{(1.22)^2 + (1.92)^2}$$

$$= \sqrt{1.49 + 3.69}$$

$$= \sqrt{2.28 \text{ percentage points}}$$

[10] Instead of referring to the tables in the way illustrated above for the sampling errors, they can be computed directly as follows for the simple design that has been specified:

$$\sigma_1^2 = \frac{p(1-p_1)}{n_1} \text{ and } \sigma_2^2 = \frac{p_2(1-p_2)}{n_2}$$

Where n_1 and n_2 are the numbers of cases in the sample in subsets 1 and 2.

APPENDIX A. CHANGING THE SAMPLING RATE FOR AN ONGOING SURVEY

In the task outline for the ongoing survey it has been assumed that a rate of sampling (1 in every "n" students) is adopted when the first enrollee sample is being set up (see Chapter 2, Step 2) and that, once adopted, the proportion of enrolled students in sample is kept about the same by updating from new students at the initial rate of sampling, 1 in every "n" students.

If the vocational programs within a State should expand substantially, with a corresponding increase in the number of completers, that State may well wish to cut the sampling rate just to keep the workload for the followup survey within reasonable bounds. Correspondingly, if the number of completers in a State should drop off sharply, it may be necessary to raise the sampling rate in order to preserve a reasonable reliability for survey estimates. This appendix outlines procedures for changing a State's sampling rate whenever, for any good reason, it becomes desirable to do so.

It is important to note that between the two procedures -- one for increasing the sampling rate, and the other for decreasing it -- the procedure for increasing is definitely more difficult to carry out. Not only does increasing the sample require more work, it also takes a longer time span to incorporate the increase into the ongoing survey. Because of this difference, a situation requiring an increase should be avoided whenever possible. If, however, a situation should arise that may risk either oversampling or undersampling, it would be more sound to risk a possible oversample (followed, presumably by a cut in the sampling rate) in preference to a possible undersample (followed, presumably, by an increase in the sampling rate).

Any change in the sampling rate should be initiated close to the start of the school year. In terms of the task outline presented in Chapter 2, the rate changing procedure should be inserted between Step 6 and Step 7 (or, in another year, correspondingly, between Step 9 and Step 10). To show the process in context, we are presenting the rate changing procedure below as Step 6.5, together with supplementary comments to show the relationship between rate changing and the steps that immediately precede and follow. For clarity, the procedures for decreasing the sampling rate and the procedure for increasing the sampling rate are shown separately.

A.1 Decreasing the Sampling Rate

Step 5. Followup Sample Identified

Comment: The effect of both Steps 6 and 7 is to update the Enrollee Sample - Step 6 updates by removing students who are no longer enrollees, Step 7 updates by adding representation from new enrollees.

Removing former students before decreasing the sampling rate for the Enrollee Sample gives the States great flexibility in how rapidly it wishes the rate decrease to effect the followup survey. If the action is not being taken under pressure, but merely anticipates the future effects of higher enrollments, then no adjustment is called for in the followup sample currently being identified. The decrease in the Enrollee Sample will presumably take care of future followup samples. On the other hand, if the State needs a quick reduction in its followup workload, it can accomplish this by a random elimination of part of the current followup sample. The decision whether or not to cut the followup sample, and if so, how much to cut it can be made independently

from what is being done to the sampling rate for the Enrollee Sample.

Step 6.5. Holdovers in Enrollee Sample Adjusted to new Lower Sampling Rate

Divide the new sampling rate "r_o" by the previous sampling rate "r_o". This rate (r_n/r_o) represents the fraction of the holdovers in the Enrollee Sample that are to be retained under the new sampling rate. Correspondingly, "1 - r_n/r_o represents the fraction of the holdovers that are to be dropped from sample.[11]

Use systematic sampling to determine which holdover enrollees are to be dropped from sample. Thus, if "1 in n" is to be discarded, take a random number "k" from the numbers 1 through n inclusive. Start at the beginning of the sample file of holdover enrollees. Count to the "k"th name; this enrollee is the first to be discarded from sample. Continue to the end of the file, discarding each additional "n"th name.

Step 7. Updating Enrollee Sample by Sampling from New Students

Comment: Step 6.5 has adjusted the sample file of holdover enrollees to the decreased sampling rate. In Step 7, the updating will be as usual, except that selection from new students will be done at the new decreased sampling rate. Thus, for the

[11]As an example, suppose the sampling rate is currently 1 in 10, and that it is to be lowered to 1 in 11. Thus, r_o = 1/10 and r_n = 1/11 1/11 ÷ 1/10 = 10/11, and 1 - 10/11 = 1/11. Consequently, dropping 1 out of each 11 holdovers in the Enrollee Sample adjusts it to the new rate.

example cited in the last footnote, updating would be done by adding 1 out of every 11 new students.

A.2 Increasing the Sampling Rate

Step 6. Followup Sample Identified

Comment: In contrast with a rate decrease, it is difficult to speed up a rate increase by modifying a followup sample that is already part way through the 3-year survey cycle. Just how difficult will vary somewhat with the State, since it depends on how much work is involved in providing a complete list of all students who either graduated from training or left schools within a specified 12-month period -- the source of the supplementary sample. Even assuming that it is feasible to select the supplementary sample for followup, however, the results for the survey are still not fully satisfactory, since there will be no background questionnaires for these added followups, and it may not be feasible to get as high a response rate from those added as from the original sample. This is why we have stressed, earlier in this chapter the importance of advance decision when an increase will be needed.

We recommend that, except for an extreme emergency, followup samples that are already part way through the survey cycle be continued as is, unaffected by the increase currently being applied to the Enrollee Sample.

Step 6.5. Holdovers in Enrollee Sample Adjusted to New Higher Sampling Rate

Subtract the previous sampling rate "r_o from the new sampling rate "r_n", and divide that difference by the complement of the previous sampling rate "$1 - r_o$". This ratio

$$\frac{r_n - r_o}{1 - r_o}$$

represents the fraction of all holdovers not in the Enrollee Sample that should be added to the holdovers already in sample.[12]

Use systematic sampling to determine which holdover enrollees are to be added to the sample. Thus, if "1 in n" is to be added, take a random number "k" from the numbers 1 through n inclusive. Start at the beginning of the list of all current enrollees who were also enrolled last year. Count to the "k"th name; this enrollee is the first to be added to the sample. Continue counting for "n" additional names (i.e., to the "k + n" name); this enrollee is the second to be added to the sample. Continue to the end of the list, adding each additional "n"th name.

The list used to obtain additional holdover enrollees for the sample may either include or exclude holdovers already in sample, according to which list is easier to obtain. If the list used does in fact include holdovers already in sample, then the added sample needs to be checked to eliminate all duplicate selections.

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[12] As an example, suppose the sampling rate is currently 1 in 9, and that it is to be increased to 1 in 8. Thus, $r_o = 1/9$ and $r_n = 1/8$.

$$\frac{r_n - r_o}{1-r_o} = \frac{1/8 - 1/9}{8/9} = \frac{1/72}{8/9} \; 1/64$$

Consequently, adding to the sample 1 out of each 64 Enrollees held over from last year and not already in sample, adjusts it to the new rate.

Step 7. Updating Enrollee Sample by Sampling from New Students

Comment: Step 6.5 has adjusted the sample file of holdover enrollees to the increased sampling rate. In Step 7, the updating will be as usual, except that selection from new students will be done at the new increased sampling rate. Thus, for the example cited in the last footnote, updating would be done by adding 1 out of every 8 new students.

APPENDIX B. INTERIM PROCEDURES FOR OBTAINING FOLLOWUP DATA PRIOR TO THE MATURING OF THE ON-GOING SURVEY

As stated earlier in this report (see beginning of Chapter 2), the proposed on-going survey is designed to provide followup data annually, but the first results are not obtained until the survey is in its third year of operation. Some States may put the proposed ongoing survey into effect, yet need to have followup results before the ongoing survey has been in operation long enough to produce them. This Appendix discusses interim procedures a State may wish to use to get early data. It is assumed that, once the on-going survey matures, such interim procedures will no longer be needed.

One question the State will need to answer is whether its need for results can be satisfied by a moderate speed-up in the mailout date for the first followup questionnaire or whether the first followup study must be given a maximum speed-up. Without any speed-up, the first followup questionnaires would be mailed out in the third year of the survey's operation; by a moderate speed-up, we refer to a plan that would mailout followup questionnaires in the second year of the survey's operation; a maximum speed-up, obviously, would send out a sample of followup questionnaires in the first year of operation. For the sake of clarity, implications for the two degrees of speed-up are discussed separately below.

B.1 A Moderate Speed-Up in Followup Results

Assuming that the on-going survey is currently being initiated, the file of sample enrollees that has just been set-up cannot be the source for a sample of former students to be followed up next year. Rather, the followup sample for next year must be selected from a complete list for last year of all eligible students who either

graduated from training or left school for other reasons (this latter list should include eligible students who finished out last year without graduating but did not enroll for the current year).

B.1.1 Method of Selection, Sample of Former Students

The proposed method for selecting a sample of former students is systematic sampling.[13] If a complete list of eligible students graduating from training or otherwise leaving school is not available, it must be constructed, presumably by combining lists obtained from each of the schools. If the school can easily provide lists that are restricted to eligible former students, and that distinguish between completers and students that left school for other reasons, this will simplify sample selection for the State. Alternatively, lists that include all students graduating or otherwise leaving school last year -- whether eligible or not -- are usable. In this event, the sampling is done first, and then a sample list is returned to each school so that the school can identify, for the sample only, which were eligible students and which were not, and, within the eligible group, which were completers and which were leavers.

Even when a separate list of eligible completers is not available, the State will, of course, know the total count of eligible completors for the last year. The State should use this total count in deciding upon a sampling rate, and thus a sample size, following the procedure discussed in Section 3.2, Proposed Sample Size. Though the State may decide to use the same sampling rate currently being used for the sample of enrollees, it is not necessary

[13] The description of sampling procedures that follows is basically the same as that already provided in Section 3.1, Method of Selection, except that it is adapted to a list of former students rather than enrollees.

that the two rates be the same. If, for example, the numbers of enrollees in the training programs has changed substantially between last year and the current year, it may be advisable to adopt a different sampling rate for last years completers and leavers than for enrollees in the current year.

The State list, from which the sample of last year's completers and leavers is to be drawn, should be arranged in a systematic order (e.g., by school, by program within school, and alphabetically within program). Note, however, that if the school lists of completers and leavers are otherwise acceptable, it is unlikely that the State would need to rearrange the order of listing for purposes of sampling. Practically any systematic ordering of former students can be used as long as there is no manipulation of the list to put certain students in sample -- or to leave certain students out of sample. Thus, the list can be considered systematically arranged if students are entered chronologically, in order of date of leaving school. Moreover, one school might find it easier to provide a strict alphabetical arrangement of all former students, while another school would have its list stratified by training program, and a third school have a list in chronological order. These various school lists could be used without changing the ordering within any one list, but simply ordering the school lists systematically (e.g., in order of school number or alphabetically by school name) and carrying over the counts of "n" students from one school list to the next.

The sampling procedure is to select one student listing for the sample from each consecutive listing of "n" students (where the sampling rate is specified as "1 in n"). This is accomplished by taking a random number "k" from the numbers 1 through n, inclusive. Count down the list of students to the "k"th name; this student is the first one chosen for the sample. Continue down the list for "n" additional names (i.e., to the "k + n"th name); this student is the

second one chosen for the sample. Continue to the end of the list, identifying each additional "n"th name as a student in sample.

We suggest that the actual sampling be done centrally at the State level rather than at the school. It could be done at the school, as an alternative, but some experience shows that it is sometimes difficult to get schools to follow sampling instructions, partly because there are various special situations coming up, with cases in the sample which the central staff may not feel make it a representative sample. The individual schools may attempt to increase the representativeness of the sample by what appear to be minor departures from the instructions, and in the process bias the sample badly. Consequently, if feasible, central sample selection is desirable. If not, selection at each school by school staff is quite feasible, but there should be some monitoring to help insure that instructions have been understood, and are being followed.

B.1.2 Advance Mailing, Sample of Former Students

If completers and leavers for last year are sampled currently, it may be a year or more before the followup questionnaire is mailed to them. If nothing is done in the meantime, it may prove difficult to achieve even the minimum 80 percent response rate for the followup recommended in Chapter 5. Since there are no background questionnaires for this sample, these former students have not been prepared for the followup, and have not provided information to facilitate the location of movers. Under these circumstances, instances of "unable to locate" are more likely to occur, and those former students that are reached may be less willing to cooperate than they would have been had they received advance notice.

As a substitute for the initial contact with sample enrollees while they are still in school, we propose that this sample of former students get an advance mailing in the current year, immediately after the sample has been selected. It would not be the objective of the advance mailing to obtain the equivalent of a background questionnaire from the student. Rather, the advance mailing would have three very limited purposes: (a) to be sure the survey has addresses for these former students that are currently valid (Postmaster returns should be requested), (b) to inform them of their inclusion in the followup survey and of the approximate timing of that survey, and (c) to ask one question only -- the name and address of relative or friend that should be able to help if, at the time of the survey, the former student turned out to be hard to locate.

B.2 A Maximum Speed-Up in Followup Results

If followup questionnaires are to be sent out in the first year of the operation of the survey, the source of the sample must be a list of students who completed or left school during the second year prior to the beginning of the survey. If, in fact, such a list is available, or can feasibly be constructed, then the method of sample selection can be the same as has already been presented in this Appendix for application to a sample of students who completed or left schools last year.

In States in which lists of completers and leavers have not been routinely prepared, it may not be easy to go back to the second year prior to the current year and construct such lists from available records. The identification of all leavers during a period 2 years ago may be quite difficult, especially those students that "leave" merely by failing to reenroll at the beginning of a term or semester. Consequently, it may be necessary for States that conduct

a followup mailout of questionnaires in the first year of the survey's operation to sample completers only, or otherwise to restrict the coverage of the followup sample.

It is probable that States that conduct a mailout followup in the first year of operation will have to settle for lower response rates, and consequently results of lower quality, than will be attainable in later years of the survey. There is not sufficient lead time before the followup mailing, for any advance mailing to serve a significant purpose. Thus, the first year survey can be expected to have more instances of "unable to locate", and more instances in which the former students do not cooperate in returning completed questionnaires. In addition, there will be no background information on the students, making the analysis less comprehensive and useful.

APPENDIX C. THE DEVELOPMENT OF A NATIONAL SAMPLE OF VOCATIONAL SCHOOLS AND STUDENTS

The development of a national sample would provide BOAE with school and various student samples as needed that could respond with data and information to critical issues necessary for the planning of vocational policy. These respondent groups could be queried on an as-needed basis possibly using a sample postcard or one-page questionnaire system that Westat has developed and implemented quite successfully for NCES. This might be most useful for surveys of schools or of currently enrolled students, recent graduates or leavers. It would give BOAE quick access (2-3 month turnaround on sample items) to their constituency so that they can be responsive not only to the needs of State and local vocational educators, but also to requests from Congress. The system could be developed quickly and be operational within a relatively short time.

A reasonable approach for a national sample would be to draw a stratified sample of schools from among the schools that are receiving Federal vocational education funds (assuming that this universe of schools will include the eligibles for which information is wanted). We shall sketch the design only briefly. We believe that, on the basis of some prior study, a sample of 400 schools will rovide useful results using in a particular survey either all 400 schools or a subsample of them.

The samples of students to be surveyed might be drawn of currently enrolled students, recent leavers, recent graduates, or others, drawn from the sampled schools. The size of such subsamples of students would depend on the particular information needed, and might vary from perhaps 500 to 5,000 or more. Either the full sample of 400 schools, or a subsample of them, might be

used in a particular survey. Also, school characteristics might be surveyed, for the sampled schools, without subsampling students. The allocation of the sample to schools and within schools would be chosen to be reasonably near optimum, taking account of unit costs and variance components. The decision on sample sizes is a technical matter that deserves additional consideration, but an initial sample of about 400 schools, and the approach to the design outlined below appears plausible, based on the information available to us.

The steps to be followed in the development of the design are as follows:

1. Obtain a list of the schools that receive funds for vocational education, and that might (or would) therefore include eligible students. Obtain from various available sources information on the grade level and type of school, the kinds of vocational education programs offered if such information is centrally available, and measures of size of each school. Measures of size would include the approximate total number of students in the school, numbers of vocational education students if available, and magnitude of vocational funds made available to the school (either from Federal sources only, or from other sources, also, if such information is available). Also ascertain the State and county in which the school is located, and information from the 1970 Census on the urban-rural characteristics of the county. Some of the information outlined here may not be available in the form suggested. It isn't necessary that it be, and other related kinds of information might be used. We assume such information is available.

The sample-design approach would be adapted to the kinds of information actually available. As one particular alternative, it might be necessary to start with a sample of school districts instead of directly with a sample of schools, because relevant information

might be available for districts and not for individual schools. In that event an appropriate adaption of the sample design would be made, but the final sample would look much like that described here. We proceed on the assumption that acceptable information would be available for individual schools, so that these are stratified and sampled directly.

2. An approximate derived measure of size is to be established for each school, presumed to be roughly equal to the number of annual eligible completers in vocational education in the school. Such a measure might be directly available. If not, it would be derived approximately from the kinds of information outlined in step 1.

3. The listed schools constitute the universe from which the stratified sample of schools would be drawn. We stratify these listed schools into school strata, using size and type of school, and type of geographic location in the stratification. Assuming a sample of 400 schools is to be drawn into the sample, 200 strata of schools are set up such that, very roughly, the expected number of completers for all schools in the stratum is approximately equivalent for each school stratum.

4. A sample of two schools is to be drawn from each school stratum, to yield a sample of 400 schools.

5. For any particular study of students, etc., proceed in each of the 400 sampled schools to draw a subsample of students, with a subsampling fraction that would yield a uniform over-all uniform probability of selection for each student. This subsampling would be done following procedures similar to those suggested in Chapter 2 of this report.

The sampling errors from such a sample would be somewhat larger than those illustrated in Chapter 3 of this report, because a variance between schools would be introduced. At the moment we do not have the information to indicate the increase in the sampling errors, but we anticipate, on the basis of other experience, that the sampling errors might reasonably be something of the order of 50 percent larger for summary statistics, with a smaller increase for more detailed statistics.

The form that this national sample approach might take would be to develop a more or less permanent basic sample of schools, that could be readily applied for taking surveys of school characteristics, programs, policies, any desired size of sampled students, recent graduates, or others, to serve basic needs as they arise. The initial cost of developing such a basic sample, ready for continuing use in one or more surveys, would be modest. Once the basic sample of schools is drawn, the time required and cost of individual surveys would depend on the sample size and the subject content of the survey. Simple surveys would be feasible on a fast time schedule.

FOLLOWUP STUDIES--BASE DATA

The following information items should be collected for all students selected in the sample for the followup studies. Information on when this data should be obtained and the sample which should be used, will be provided by HEW at a later date.

Student name (full name)

Maiden name or any other former names

Sex

Year of birth

Racial/ethnic self-designation
- American Indian or Alaskan Native
- Asian or Pacific Islander
- Black, not of Hispanic origin
- Hispanic
- White, not of Hispanic origin

Current address (telephone)

Permanent address (if different) (telephone)

Address of someone likely to always know your location (telephone)

Vocational education instructional field studied

State

FICE Code

Standard Metropolitan Statistical Area

Labor Market Area

Congressional District

Participation in special education programs
- Bilingual (for limited English speaking ability students)
- Disadvantaged
- Handicapped
- Cooperative education
- Work study

Student Financial aid received (postsecondary only) e.g. BEOG or SEOG in total dollars)

Vocational Objective

Completion status

Completed program, or left with marketable skill to take a job in field

Left for other reasons

Date when left or completed school (month, year)

FOLLOWUP STUDIES--FOLLOWUP FORM

This information would be obtained on the completers and leavers in each followup mailing.

Student name (full name)

Maiden name or any other former names

Current address (if different) (telephone)

Permanent address (if different) (telephone)

Additional training or education received since leaving vocational education program

- None
- On-the-job training (employer-sponsored training program)
- Apprenticeship
- Specialized occupational training through military service
- Other: please specify

Employment status

- Employed (employed in military service)
- Unemployed (actively looking for a job)
- Not in Labor Force (check reason: taking further training or education, illness, housewife or pregnancy, not interested in employment)
- Other: please specify

First job (after graduation)

- Employer name
- Employer address (telephone, if known)
- Job title
- Job duties — To be coded in DOT codes
- Immediate supervisor (name)
- Full or part-time job
- Job related to vocational training? related/not related
- Number of months in this job since graduation

Present job (if differenct from first job)

- Employer name
- Employer address (telephone, if known)
- Job title
- Job duties — To be coded in DOT codes
- Immediate supervisor (name)
- Full or part-time job
- Job related to vocational training? related/not related
- Number of months in this job since graduation

FOLLOWUP STUDIES--EMPLOYER FORM

This information would be obtained from the supervisor for the most current employment cited by each completer and leaver in the student sample. Each form would be linked to the student data file.

Name of student (preprinted, to be verified)

Name of employer (preprinted, to be verified)

Job title

Job duties

Evaluation of technical skills (compared to others in the same work group)
- Ability to use tools and equipment
- Job knowledge: technical information possessed
- Readiness to learn new techniques on the job
- Productivity, ability to meet quantity demands
- Accuracy of work. quality and thoroughness

Evaluation of job readiness (compared to others in the same work group)
- Positive attitude toward work
- Realistic concept of what job involves
- Dependability, Attendance, and Punctuality
- Initiative, does jobs that need doing
- Ability to get along with others
- Judgment, ability to make decisions, plan, organize

Comments

Name of supervisor providing rating

Address and telephone of supervisor

Date

DEFINITIONS FOR FOLLOWUP STUDIES

Among the definitions needed for this series of data collection efforts are the following.

Cooperative Education

"(18) The term 'cooperative education' means a program of vocational education for persons who, through written cooperative arrangements between the school and employers, receive instruction, including required academic courses and related vocational instruction be alternation of study in school with a job in any occupational field, but these two experiences must be planned and supervised by the school and employers so that each contributes to the student's education and to his or her employability. Work periods and school attendance may be on alternate half days, full days, weeks, or other periods of time in fulfilling the cooperative program.

Work Study

Means a school program designed to provide financial assistance through part-time employment in nonprofit agencies for students who require such aid in order to enter or continue their education and training in a vocational education program. The part-time employment may or may not be related to the student's occupational objective or vocational program.

Vocational Objective

Vocational objective is the occupational outcome of training and other preparation as stated by an individual student. The vocational objective usually is stated in terms of a specific job title.

Job Title

Job title is the common name by which a position is identified. The generally accepted source of nomenclature is the Dictionary of Occupational Titles, published by the Department of Labor.

Job Duties

Job duties is a description of the job-related tasks included in a specific job title. The tasks required by the job define the position.